Potentially Preventable Complications (PPCs)

Potentially Preventable Readmissions (PPRs)

8 September 2008

Potentially Preventable Complications (PPCs)

Assumptions

- Not all inpatient complications are preventable
- Even with optimal care inpatient complications will occur
- Patients who have had a problem with the quality of care will be more likely to have an inpatient complication
- Hospitals with quality of care problems will have higher rates of inpatient complications
- A patient's risk of an inpatient complication is related to the patient's reason for admission and severity of illness at the time of admission

Overview
PPCs: What Do They Do?

- Identify in-hospital complications using computerized discharge abstract data
- Adjust for risk of complications based on
  - *Reason for admission*
  - *Severity of Illness*
- Calculate expected complication rates
- Compare actual and expected complication rates at the hospital level

Determining Potentially Preventable Complications – a General Rule

If a hospital or other health care facility has a statistically significantly higher rate of a complication (or group of complications) than comparable hospitals and facilities, reasonable clinicians would be concerned that a potential quality of care problem exists, and would suggest further investigation in order to account for the difference.

Development of PPCs

- Requires availability of present on admission indicator
  - *MD established statewide POA collection/reporting on 7/1/07*
- Identify post admission events that represent a complication
  - *Clinical panels*
- Identify chance circumstances under which the complication is potentially preventable
  - *Clinical panels*
- Develop a method of risk adjusting complication rates

3M's Approach to Preventable Conditions Potentially Preventable Complications

- Potentially Preventable Complications (PPCs): Harmful events (accidental laceration during a procedure) or negative outcomes (hospital acquired pneumonia) that may result from the process of care and treatment rather than from a natural progression of underlying disease
- All broad categories of the AHRQ PSI's, NQF, and CMS list are built into the PPCs.
- PPCs are a much larger list than others: because there are numerous exclusions and extensive risk adjustment built into the PPC list. (Example: exclusions are built into the decubitus ulcer PPC that are not present for either the AHRQ PSI or the CMS HAC category)

PPC Diagnoses and PPC Groups

- Of 13,367 ICD-9 CM diagnosis codes, we identified 1,450 as PPC diagnoses
- Each of the 1,450 codes designated as PPC diagnoses were assigned to one of 64 mutually exclusive PPC Groups (PPCs for short), based on similarities in clinical presentation and clinical impact

Post-Admission Patient Complication Groups (PPCs) - Examples

Extreme CNS Complications

3481	Anoxic Brain Damage
3484	Compression of Brain
3485	Cerebral Edema
78001	Coma
78003	Persistent Vegetative State

Congestive Heart Failure

4150	Acute Cor Pulmonale
4280	Congestive Heart Failure
4281	Left Heart Failure
42821	Acute systolic HF
42822	Acute & chronic HF
42831	Acute diastolic HF
42833	Acute & chronic diastolic HF
42841	Acute systolic/diastolic HF
42843	Acute/chronic systolic/diastolic HF
4289	Heart Failure NOS

Pneumonia PPC - Exclusions

The pneumonia PPC is not applicable to patients admitted with diagnoses in the following categories:

- Those requiring mechanical ventilation
- Cystic Fibrosis
- Pulmonary Edema & Respiratory Failure
- Major Chest & Respiratory Trauma
- Respiratory Malignancy
- Major Respiratory Infections & Bacterial pneumonias
- Bronchiolitis & RSV Pneumonia
- Other Pneumonia

Selected PPCs (35 of the Most Significant PPCs)

Extreme Complications

- Extreme CNS Complications
- Acute Pulmonary Edema & Respiratory Failure w Ventilation
- Shock
- Ventricular Fibrillation, Cardiac Arrest
- Renal Failure with Dialysis
- Post-Operative Respiratory Failure w Tracheostomy

Cardiovascular-Respiratory Complications

- Stroke & Intracranial Hemorrhage
- Pneumonia, Lung Infection
- Aspiration Pneumonia
- Pulmonary Embolism
- Congestive Heart Failure
- Acute Myocardial Infarct
- Peripheral Vascular Complications Except VT
- Venous Thrombosis

Gastrointestinal Complications

- Major GI Complications w Transfusion or Signif Bleeding
- Major Liver Complications

Infectious Complications

- Clostridium Difficile Colitis
- Urinary Track Infection
- Septicemia & Severe Infection

Perioperative Complications

- Post-Op Wound Infection & Deep Wound Disruption w Procedure
- Reopening of Surgical Site
- Post-Op Hemorrhage & Hematoma w Hemorrhage Control Proc or I&D Proc
- Accidental Puncture/Laceration During Invasive Procedure
- Post-Op Foreign Body

Malfunctions, Reactions Etc.

- Iatrogenic Pneumothrax
- Mechanical Complication of Device, Implant & Graft
- Inflammation, & Other Complications of Devices, Implants or Grafts Except Vascular Infection
- Infections due to Central Venous Catheters

Obstetrical Complications

- Obstetrical Hemorrhage w Transfusion
- Obstetrical Laceration & Other Trauma w/o Instrumentation
- Obstetrical Laceration & Other Trauma w Instrumentation
- Major Puerperal Infection and Other Major Obstetrical Complications

Other Medical and Surgical Complications

- Post-Hemorrhagic & Other Acute Anemia w Transfusion
- Decubitus Ulcer
- Encephalopathy

Rates per 1,000 Patients for the Pneumonia PPC Among GI Surgery Groups – By Severity of Illness on Admission

Admission Severity Level	Major GI Surgery	Mod GI Surgery	Other GI Surgery	All GI Surgery
1	17	10	3	7
2	46	35	14	28
3	130	99	42	105
4	196	148	114	185
All Severity Levels	63	33	9	29

Data from State of California 1999-2000

Number & Rate per 1,000 - Patients With One or More Major PPCs in Selected APR-DRGs, by Severity Level - California, 1999-2000

Admission APR-DRG		Admission Severity of Illness Level				
Surgical		**SOI 1**	**SOI 2**	**SOI 3**	**SOI 4**	**Total**
Craniotomy except for Trauma	**PPCs**	264	553	663	150	1,630
	At Risk	4,339	3,642	2,313	533	10,827
	N/1,000	61	152	287	281	151
Extracranial Vascular Procedures	**PPCs**	238	297	161	6	702
	At Risk	9,850	4,525	822	27	15,224
	N/1,000	24	66	196	222	46
Coronary Artery BP Graft with Cath	**PPCs**	336	1,998	1,433	99	3,866
	At Risk	3,430	13,260	4,946	348	21,984
	N/1,000	98	151	290	285	176
Percutaneous CV Procs with Acute MI	**PPCs**	361	550	335	105	1,351
	At Risk	27,295	19,407	4,366	517	51,585
	N/1,000	13	28	77	203	26
Major Large & Small Bowel Procedures	**PPCs**	320	1,156	1,416	353	3,245
	At Risk	8,617	11,017	5,187	894	25,715
	N/1,000	37	105	273	395	126

Number & Rate per 1,000 - Patients With One or More Major PPCs in Selected APR-DRGs, by Severity Level – California, 1999-2000

Admission APR-DRG		Admission Severity of Illness Level				
Medical		**SOI 1**	**SOI 2**	**SOI 3**	**SOI 4**	**Total**
Cerebrovascular Accidents	**PPCs**	34	590	813	245	1,682
	At Risk	4,056	21,231	8,307	1,192	34,786
	N/1,000	8	28	98	206	48
Major Pneumonia	**PPCs**	41	400	826	729	1,996
	At Risk	2,803	11,786	14,329	4,852	33,770
	N/1,000	15	34	58	150	59
Other Pneumonia	**PPCs**	101	891	1,027	807	2,826
	At Risk	24,694	57,313	28,300	3,892	114,199
	N/1,000	4	16	36	207	25
COPD	**PPCs**	144	432	400	400	1,376
	At Risk	20,224	27,677	10,845	2,211	60,957
	N/1,000	7	16	37	181	23
Acute MI	**PPCs**	155	976	873	420	2,424
	At Risk	6,925	20,510	8,959	2,530	38,924
	N/1,000	22	48	97	166	62

Impact of Major PPC Categories on Average Charges for GI Surgery

		Major GI Surg		Mod GI Surg		Other GI Surg	
		Major PPC	No PPC	Major PPC	No PPC	Major PPC	No PPC
Level 1	N	545	12,644	314	11,604	470	55,160
	Avg $	$94,147	$27,849	$87,316	$23,030	$42,423	$14,530
Level 2	N	2,197	14,833	724	8,902	950	27,714
	Avg $	$130,836	$40,508	$104,258	$32,074	$66,830	$22,055
Level 3	N	2,899	5,932	669	2,132	576	4,299
	Avg $	$169,039	$62,697	$137,786	$48,011	$107,951	$35,208
Level 4	N	1,133	1,139	224	384	148	317
	Avg $	218,217	$125,472	$209,538	$94,746	$162,015	$83,259
Total	N	6,774	34,548	1,931	23,022	2,144	87,490
	Avg $	$158,849	$42,486	$125,332	$30,036	$79,098	$18,179

California hospital data 1999-2000

PPC Group - Post-Operative Wound Infection and Deep Wound Disruption with Procedure
(California 2005-06 - Number of Patients Eligible = 362,161)

ICD-9 CM Code	Procedure Description	Number with PPC	Rate (%)
All patients with a repeat procedure of			
54.61	Reclose post-operative disruption*	318	0.088
Or - Patients with a diagnosis of wound disruption or wound infection *and* one of the following 7 repeat procedures:			
54.0	Abdominal wall incision	48	0.013
54.11	Exploratory laparotomy	24	0.007
54.12	Reopen recent laparotomy site	276	0.076
54.19	Laparotomy NEC	168	0.046
54.21	Laparoscopy	32	0.009
54.3	Excision or destruction of abdominal wall lesion	40	0.011
54.92	Remove foreign body from peritoneum	13	0.004
	Total	**840**	**0.232**

NY PPC Quality Screens – 3rd Release with 2006 Data

Report 1
Overall Rates of Major Potentially Preventable Complications (PPCs)
Natiional Elsewhere Hospital (0000)
For Discharges in the Year Beginning January 1, 2006 and Ending December 31, 2006

National Elsewhere Hospital Compared to New York State

Category	Discharges		Discharges with One or More Major PPCs		Major PPC Rate/1,000		% Difference	Significance Level
	Total	At Risk for PPC	Actual	Expected	Observed	Expected		
Total	78,108	61,234	2,686	2,264	43.86	36.97	18.64	*
Medical	45,686	31,450	1,045	807	33.23	25.66	29.50	*
Surgical	22,370	19,753	1,148	1,077	58.12	54.52	6.60	*
Obstetrical	10,052	10,031	493	380	49.15	37.88	29.75	*

National Elsewhere Hospital Compared to Northeast Region

Category	Discharges		Discharges with One or More Major PPCs		Major PPC Rate/1,000		% Difference	Significance Level
	Total	At Risk for PPC	Actual	Expected	Observed	Expected		
Total	78,108	61,234	2,686	2,398	43.86	39.17	11.97	*
Medical	45,686	31,450	1,045	905	33.23	28.78	15.46	*
Surgical	22,370	19,753	1,148	1,156	58.12	58.52	-0.68	***
Obstetrical	10,052	10,031	493	338	49.15	33.66	46.02	*

National Elsewhere Hospital Compared to Peer Group U6 - Urban Teaching

Category	Discharges		Discharges with One or More Major PPCs		Major PPC Rate/1,000		% Difference	Significance Level
	Total	At Risk for PPC	Actual	Expected	Observed	Expected		
Total	78,108	61,234	2,686	2,268	43.86	37.04	18.41	*
Medical	45,686	31,450	1,045	775	33.23	24.64	34.86	*
Surgical	22,370	19,753	1,148	1,046	58.12	52.95	9.76	
Obstetrical	10,052	10,031	493	447	49.15	44.53	10.38	*

Note: - Expected PPC rates computed using SPARCS 2006 data (excluding specialty hospitals)
- Only patients "at risk" for the PPC were included in the PPC analysis (e.g. all multiple trauma patients were excluded)
- Definition of peer group and region provided by the Hospital Association of New York State

* Statistically significant (p<0.05) higher rate of PPCs
*** Statistically significant (p<0.05) lower rate of PPCs

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Report 2
Rates of Major PPCs by Service Line

Elsewhere Hospital 0000 Compared to New York State
For Discharges with One or More Major PPCs
For Discharges in the Year Beginning January 1, 2006 and Ending December 31, 2006

No.	Service Line	Discharges At Risk for PPC	Discharges with One or More Major PPC		One or More Major PPC Rate/1,000		% Difference	Significance Level
			Actual	Expected	Actual	Expected		
001	NEUROSURGERY	759	57	59.8	75.09	78.87	-4.79	
002	NEUROLOGY	2,621	99	71.9	37.77	27.43	37.66	*
003	CARDIAC S							
004	THORACIC							
005	VASCULAR							
006	INFECTIOU							
007	OPTHALM							
008	OTOLARYN							
009	PLASTIC S							
010	PULMONAR							
011	ONCOLOG							
012	CARDIOLO							
013	GENERAL							
014	GASTROE							
015	ORAL SUR							
016	ORTHOPE							
017	RHEUMAT							
018	DERMATO							
019	GYNECOL							
020	ENDOCRIN							
021	UROLOGY							
022	NEPHROL							
023	OBSTETRI							
025	NEONATAL							
026	NEWBORN							
027	HEMATOL							
028	PSYCHIAT							
029	SUBSTANC							
030	ADVERSE							
031	BURNS							
032	REHABILIT							
033	SIGNS & S							
034	OTHER							
035	CARDIOLO							
Total:								

Note: - Expected PPC
- Patients belo

* Statisti
*** Statisti

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Report 2
Rates of Major PPCs by Service Line

Elsewhere Hospital 0000 Compared to New York State
For Discharges with One or More Major PPCs
For Discharges in the Year Beginning January 1, 2006 and Ending December 31, 2006

No.	Service Line	Discharges At Risk for PPC	Discharges with One or More Major PPC		One or More Major PPC Rate/1,000		% Difference	Significance Level
			Actual	Expected	Actual	Expected		
001	NEUROSURGERY	759	57	59.8	75.09	78.87	-4.79	
002	NEUROLOGY	2,621	99	71.9	37.77	27.43	37.66	*
003	CARDIAC SURGERY							
004	THORACIC SURGER							
005	VASCULAR SURGER							
006	INFECTIOUS DISEAS							
007	OPTHALMOLOGY							
008	OTOLARYNGOLOGY							
009	PLASTIC SURGERY							
010	PULMONARY MEDIC							
011	ONCOLOGY							
012	CARDIOLOGY							
013	GENERAL SURGERY							
014	GASTROENTEROLO							
015	ORAL SURGERY							
016	ORTHOPEDICS							
017	RHEUMATOLOGY							
018	DERMATOLOGY							
019	GYNECOLOGY							
020	ENDOCRINOLOGY							
021	UROLOGY							
022	NEPHROLOGY							
023	OBSTETRICS							
025	NEONATALOGY							
026	NEWBORN							
027	HEMATOLOGY							
028	PSYCHIATRY							
029	SUBSTANCE ABUSE							
030	ADVERSE EFFECTS							
031	BURNS							
032	REHABILITATION							
033	SIGNS & SYMPTOMS							
034	OTHER							
035	CARDIOLOGY-INVAS							
Total:								

Note: - Expected PPC rates co
- Patients belong to only

* Statistically signif
*** Statistically signif

04/14/2008

Report 4
Rates of Major PPCs by Major PPC Group for Service Line 01 Neurosurgery

Elsewhere Hospital 0000 Compared to New York State
For Discharges with One or More Major PPCs
For Discharges In the Year Beginning January 1, 2006 and Ending December 31, 2006

Major PPC		Discharges At Risk for PPC	Discharges with Major PPC Total Cases		Major PPC Rate/1,000		% Difference	Significance Level
			Actual	Expected	Actual	Expected		
Discharges with One or More Major PPCs								
01	STROKE & INTRACRANIAL HEMORRHAGE	593	4	6.8	6.75	11.39	-40.79	
02	EXTREME CNS COMPLICATIONS	360	0	1.0	0.00	2.78	-100.00	
03	ACUTE PULMONARY EDEMA AND RESPIRATORY FAILURE WITH MECHANICAL VENTILATION	671	13	14.1	19.37	21.08	-8.09	
04	PNEUMONIA & OTHER LUNG INFECTIONS	606	0	0.0	0.00	0.00	0.00	
05	ASPIRATION PNEUMONIA	611	5	3.6	8.18	5.88	39.19	
06	PULMONARY EMBOLISM	708	2	2.0	2.82	2.81	0.62	
07	SHOCK	701	2	1.1	2.85	1.62	75.92	
08	CONGESTIVE HEART FAILURE	683	5	3.9	7.32	5.64	29.74	
09	ACUTE MYOCARDIAL INFARCT	708	4	3.9	5.65	5.46	3.53	
10	VENTRICULAR FIBRILLATION/CARDIAC ARREST	708	2	2.5	2.82	3.53	-20.03	
11	PERIPHERAL VASCULAR COMPLICATIONS EXCEPT VENOUS THROMBOSIS	704	2	1.5	2.84	2.12	34.26	
12	VENOUS THROMBOSIS	706	7	7.3	9.92	10.33	-4.03	
13	MAJOR GASTROINTESTINAL COMPLICATIONS WITH TRANSFUSION OR SIGNIFICANT BLEEDING	707	1	0.5	1.41	0.69	105.07	
14	MAJOR LIVER COMPLICATIONS	707	1	0.4	1.41	0.59	141.24	
15	CLOSTRIDIUM DIFFICILE COLITIS	708	0	0.0	0.00	0.00	0.00	
16	URINARY TRACT INFECTION	737	19	21.1	25.78	28.60	-9.85	
17	RENAL FAILURE WITH DIALYSIS	698	0	0.5	0.00	0.69	-100.00	
18	POST-HEMORRH & OTHER ACUTE ANEMIA WITH TRANSFUSION	700	0	1.3	0.00	1.79	-100.00	
19	DECUBITUS ULCER	747	0	0.0	0.00	0.00	0.00	
20	SEPTICEMIA & SEVERE INFECTIONS	689	0	0.0	0.00	0.00	0.00	
21	POST-OP WOUND INFECTION & DEEP WOUND DISRUPTION WITH PROCEDURE	722	0	0.0	0.00	0.00	0.00	
22	REOPENING SURGICAL SITE	863	1	0.5	1.46	0.74	97.48	
23	POST-OP HEMORRHAGE & HEMATOMA WITH HEM CNTRL PROC OR I&D PROC	708	2	0.7	2.82	0.95	196.71	
24	ACCIDENTAL PUNCTURE/LACERATION DURING INVASIVE PROCEDURE	708	0	2.2	0.00	3.17	-100.00	
25	POST-PROCEDURE FOREIGN BODIES	708	2	0.2	2.82	0.36	709.43	
26	ENCEPHALOPATHY	590	0	1.0	0.00	1.69	-100.00	
27	IATROGENIC PNEUMOTHRAX	677	2	0.8	2.95	1.23	139.59	
28	MECHANICAL COMPLICATION OF DEVICE, IMPLANT & GRAFT	704	2	2.6	2.84	3.70	-23.18	
29	INFLAMMATION & OTHER COMPLICATIONS OF DEVICES, IMPLANTS OR GRAFTS EXCEPT VASCULAR INFECTION	704	3	4.0	4.26	5.66	-24.67	
30	INFECTIONS DUE TO CENTRAL VENOUS CATHETERS	755	0	0.0	0.00	0.00	0.00	
31	OBSTETRICAL HEMORRHAGE WITH TRANSFUSION	0	0	0.0	0.00	0.00	0.00	
32	OBSTETRIC LACERATIONS & OTHER TRAUMA WITHOUT INSTRUMENTATION	0	0	0.0	0.00	0.00	0.00	
33	OBSTETRIC LACERATIONS & OTHER TRAUMA WITH INSTRUMENTATION	0	0	0.0	0.00	0.00	0.00	
34	MAJOR PUERPERAL INFECTION AND OTHER MAJOR OBSTETRIC COMPLICATIONS	0	0	0.0	0.00	0.00	0.00	
35	POST-OP RESP FAILURE WITH TRACHEOSTOMY	595	0	0.3	0.00	0.42	-100.00	
Discharges with a Single Major PPC		759	40	42.4	52.70	55.85	-5.63	
Discharges with Two Major PPCs		759	12	12.3	15.81	16.15	-2.09	
Discharges with Three or More Major PPCs		759	5	5.2	6.59	6.86	-4.02	
Discharges with One or More Major PPCs		759	57	59.9	75.10	78.86	-4.77	

Note: - Expected PPC rates computed using SPARCS 2006 data (excluding specialty hospitals)
- Patients belong to only one service line, based on admitting APR-DRG.

* Statistically significant (p<0.05) higher rate of PPCs
*** Statistically significant (p<0.05) lower rate of PPCs

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Summary
PPCs: What Do They Do?

- Identify in-hospital complications using computerized discharge abstract data
- Adjust for risk of complications based on
  - *Reason for admission*
  - *Severity of Illness*
- Calculate expected complication rates
- Compare actual and expected complication rates at the hospital level

Potentially Preventable Readmissions (PPRs)

Assumptions Underlying the Examination of PPRs

- Not all readmissions are preventable, but
- Patients who have had a problem with the quality of care either during or after a hospitalization will be more likely to be readmitted
  - *Discharged too sick, too quick*
  - *Poor discharge planning*
  - *Poor follow-up care*
- A hospital with these types of quality problems will be more likely to have higher rates of readmissions
  - *For certain types of patients*
  - *Across the board*

Definition of a Potentially Preventable Readmission

A readmission to the hospital within a specified time interval that reasonable clinicians would agree was:

- Likely related to the initial hospital stay, and
- Potentially preventable by means of:
  - *Quality care during the first hospitalization; or*
  - *Adequate coordination with the outpatient setting – including:*
    - *Discharge planning*
    - *Outpatient health professional team and*
    - *The patient/family/caregiver.*

PPRs Must Be Clinically Meaningful

- Case 1:
  - *Initial admission: Asthma*
  - *Readmission 8 days p discharge: Asthma*
- Case 2:
  - *Initial admission: Acute MI*
  - *Readmission 6 days p discharge with CHF*
- Case 3:
  - *Initial admission: Pneumonia*
  - *Readmission 4 days p discharge: Fractured femur & skull sustained in motor vehicle accident*

Exclusions from the readmission methodology

- No possible clinical relation to the index admission (cholecsytectomy two weeks after total hip replacement);
- Not clearly related to improvement opportunities in either hospital or outpatient care (e.g. readmissions for malignancy care or a motor vehicle accident)

Three other factors make a readmission not potentially preventable

- Discharge status of prior discharge
  - *AMA and transferred to another acute care hospital*
- Type of prior discharge
  - *Follow-up care is intrinsically complex and extensive*
    - *Metatastic malignancies*
    - *Multiple trauma*
    - *Burns*
- Length of time interval between discharge and readmission
  - *Long time intervals (>30 days) reduce confidence that readmission is causally linked to the prior discharge*

Just an excerpt

Drg	Initial Admission: / Readmission:	MAJ RESPIRATORY & CHEST PROC	OTH RESPIRATORY & CHEST PROC	RESPIRATORY SYSTEM DIAG	CYSTIC FIBROSIS	BPD & OTH CHRONIC RESP DIS	PULMONARY EDEMA & RESP FAIL	PULMONARY EMBOLISM	MAJOR CHEST & RESP TRAUMA	RESPIRATORY MALIGNANCY	MAJOR RESPIRATORY INFECTIONS	BRONCHIOLITIS & RSV PNEUM	OTHER PNEUMONIA	CHRONIC OBSTRUCTIVE PULM DIS	ASTHMA
		120	121	130	131	132	133	134	135	136	137	138	139	140	141
120	MAJ RESPIRATORY & CHEST PROC	X	x	x	Y	Y	X	X	4-x	4	4-x	4-x	4-x	Y	X
121	OTH RESPIRATORY & CHEST PROC	X	x	x	Y	Y	X	X	x	4	4-x	4-x	4-x	Y	X
130	RESPIRATORY SYSTEM DIAG	X	X	X	x	x	X	X	x3	x3	x3	x3	x3	Y	X
131	CYSTIC FIBROSIS	X	X	X	x	x	X	X	X	X	X	X	X	Y	X
132	BPD & OTH CHRONIC RESP DIS	X	X	X	x	x	X	X	X	X	X	X	X	Y	X
133	PULMONARY EDEMA & RESP FAIL	X	X	X	x	x	X	X	x3	x3	X3	X3	X3	Y	X
134	PULMONARY EMBOLISM	X	X	X	x	x	X	X	x3	x3	x-3	x-3	x-3	Y	X
135	MAJOR CHEST & RESP TRAUMA	X	X	X	x	x	X	X	X	X	X	X	X	Y	X
136	RESPIRATORY MALIGNANCY	X	X	X	x	x	X	X	x	x	x	x	x	x	X
137	MAJOR RESPIRATORY INFECTIONS	X	X	X	x	x	X	X	X-3	x3	X-3	X-3	X-3	3	X
138	BRONCHIOLITIS & RSV PNEUM	X	X	X	x	x	X	X	x	X	X	X	X	Y	X
139	OTHER PNEUMONIA	X	X	X	x	x	X	X	x3	x3	X-3	X-3	X-3	3	X
140	CHRONIC OBSTRUCTIVE PULM DIS	X	X	X	x	x	X	X	y-2	y-2	Y-2	Y-2	Y-2	Y-2	X
141	ASTHMA	X	X	X	x	x	X	X	X-2	X-2	X-2	X-2	X-2	X-2	X
142	INTERSTITIAL LUNG DISEASE	X	X	X	X	X	X	X	X-2	X-2	X-2	X-2	X-2	X-2	X
143	OTHER RESPIRATORY DIAGNOSES	X	X	X	X	X	X	X	X	X	X	X	X	Y	X
144	RESP SIGNS & SYMPTONS	X	X	X	X	X	X	X	X	X	X	X	X	Y	X
160	MAJ CARDIOTHORACIC REPAIR	X	x	x	Y	Y	X	X	4-x	4-x	4-x	4-x	4-x	Y	X

PPRs – Development Issues

- What about transfers from other facilities?
- What about patients with multiple admissions?

Chain Rules

- *Chain Rules* were defined for creating a “readmission chain” (that is an initial index admission followed by a number of related readmissions)
- For example: Any elective surgical admission that occurs after a medical admission is not considered to be related and thus “terminates” a chain.

Example of a Readmission Chain

Initial Admission:	CABG surgery
Readmission:	Post op wound infection
Readmission:	PTCA

- Both readmissions are related to the CABG surgery
- Without readmission chains the readmission sequence is a CABG discharge with one readmission followed by an unrelated PTCA admission
- With readmission chains the readmission sequence is a CABG discharge with two related readmissions.

Readmission Issues

- Readmission time window
- Readmission to same hospital or any hospital
- Excluded sites of service
- Computation of expected value for individuals with mental illness

Potentially Preventable Hospital Readmission Rates (MedPAC 2007)

	Patients readmitted to hospital within:		
	7 days	**15 days**	**30 days**
Rate of potentially preventable readmissions	5.2%	8.8%	13.3%
Spending on potentially preventable readmissions (in billions)	$5	$8	$12

Source: 3M analysis of 2005 Medicare discharge claims.

Readmission: to the same hospital or to any hospital?

	Readmission Time Interval		
PPR Rate (%):	**7 Days**	**15 Days**	**30 Days**
Readmission to Same Hospital	3.80	5.89	8.34
Readmission to Any Hospital	4.84	7.44	10.37

Source: Florida hospitalizations, 2004-2005

Top 10 Medical Initial Admissions – Ranked by Readmission Frequency (Florida 2004-2005)

Rank	APR DRG	APR DRG Description	Number with PPR Chains	PPR Rate (%)
1	194	Heart failure	15,053	12.5
2	140	Chronic obstructive pulmonary disease	8,271	9.7
3	750	Schizophrenia	7,592	17.7
4	139	Other pneumonia	7,579	7.6
5	751	Major depressive disorder	5,608	10.9
6	198	Angina pectoris & coronary atherosclerosis	5,151	5.6
7	753	Bipolar disorders	4,830	14.0
8	720	Septicemia & disseminated infection	4,370	12.6
9	460	Renal failure	4,288	12.7
10	201	Cardiac arrhythmia & conduction disorders	4,066	6.2

Top 10 Surgical Initial Admissions – Ranked by Readmission Frequency (Florida 2004-2005)

Rank	APR DRG	APR DRG Description	Number with PPRs	PPR Rate (%)
1	175	Percutaneous cardiovascular proc w/o AMI	7,260	7.9
2	221	Major small & large bowel procedure	3,426	9.4
3	173	Other vascular procedures	3,186	11.3
4	174	Percutaneous cardiovascular procedure w/AMI	3,115	9.7
5	301	Hip joint replacement	2,870	6.1
6	165	Coronary bypass w catheterization/percut	2,638	12.2
7	308	Hip/femur proc for trauma except joint replacement	2,395	8.0
8	302	Knee joint replacement	2,373	3.9
9	161	Cardiac defibrillator/heart assist implant	2,048	9.3
10	171	Perm cardiac pacemaker w/o AMI/HF/Shock	2,044	8.0

Top 5 Reasons for Readmission for Two Initial Admission APR-DRGs

- ACUTE MYOCARDIAL INFARCT 2,358
  - *194 HEART FAILURE 459*
  - *198 ANGINA PECT & CORONARY ATH 354*
  - *190 ACUTE MYOCARDIAL INFARCT 347*
  - *166 COR BYPASS W/O CARD CATH 205*
  - *175 PERCUT CARDIOVASC W/O AMI 185*
- CORONARY BYPASS W/CARD CATH 1,386
  - *194 HEART FAILURE 165*
  - *721 POST-OP/POST-TRAUM INFEC 134*
  - *143 OTHER RESPIRATORY DIAGNOSES 118*
  - *198 ANGINA PECT & CORONARY ATH 90*
  - *201 CARD ARRHYTHMIA & 90*

Categories of Reasons for Readmission

1. Medical readmission for a continuation or recurrence of the reason for the initial admission, or for a closely related condition
2. Medical readmission for an acute decompensation of a chronic problem unrelated to the reasons for the initial admission, but plausibly related to pre- or post–discharge care
3. Medical readmission for an acute medical complication plausibly related to care in the initial admission
4. Readmission for a surgical procedure to address a continuation or a recurrence of the problem causing the initial admission
5. Readmission for a surgical procedure to address a complication resulting from care during the initial admission.

The Need for Risk Adjustment

- A patient's risk of a readmission is related not only to quality of care, but also to:
  - *The reason for admission & underlying medical conditions*
  - *The severity of illness at the time of admission*
- Therefore, comparison of readmission rates across hospitals requires adjustment for reason for admission and severity of illness

Patients With At Least One PPR in Selected APR-DRGs, by Severity Level
(Wisconsin, 2000-02)

Admission APR-DRG		Admission Severity of Illness Level				
Surgical		**SOI 1**	**SOI 2**	**SOI 3**	**SOI 4**	**Total**
	PPRs	92	581	328	53	1054
Stroke	**At Risk**	1,601	7,386	2,691	317	11,995
	Percent	5.7	7.8	12.1	16.7	8.7
	PPRs	350	1,774	1,451	118	3,693
Other Pneumonia	**At Risk**	8,342	20,173	10,407	735	39,657
	Percent	4.1	8.7	13.9	16.0	9.3
	PPRs	227	1,180	731	167	2,305
CABG without Catheterization	**At Risk**	2,842	9,957	3,926	822	17,547
	Percent	7.9	11.8	18.6	20.3	13.1
	PPRs	247	823	573	128	1,771
Acute MI	**At Risk**	2,338	5,995	2,990	632	11,955
	Percent	10.5	13.7	19.1	20.2	14.8
	PPRs	411	920	529	169	2,029
Major Large & Small Bowel Procedures	**At Risk**	5,305	9,246	4,402	916	19,869
	Percent	7.7	9.9	12.0	18.4	10.2

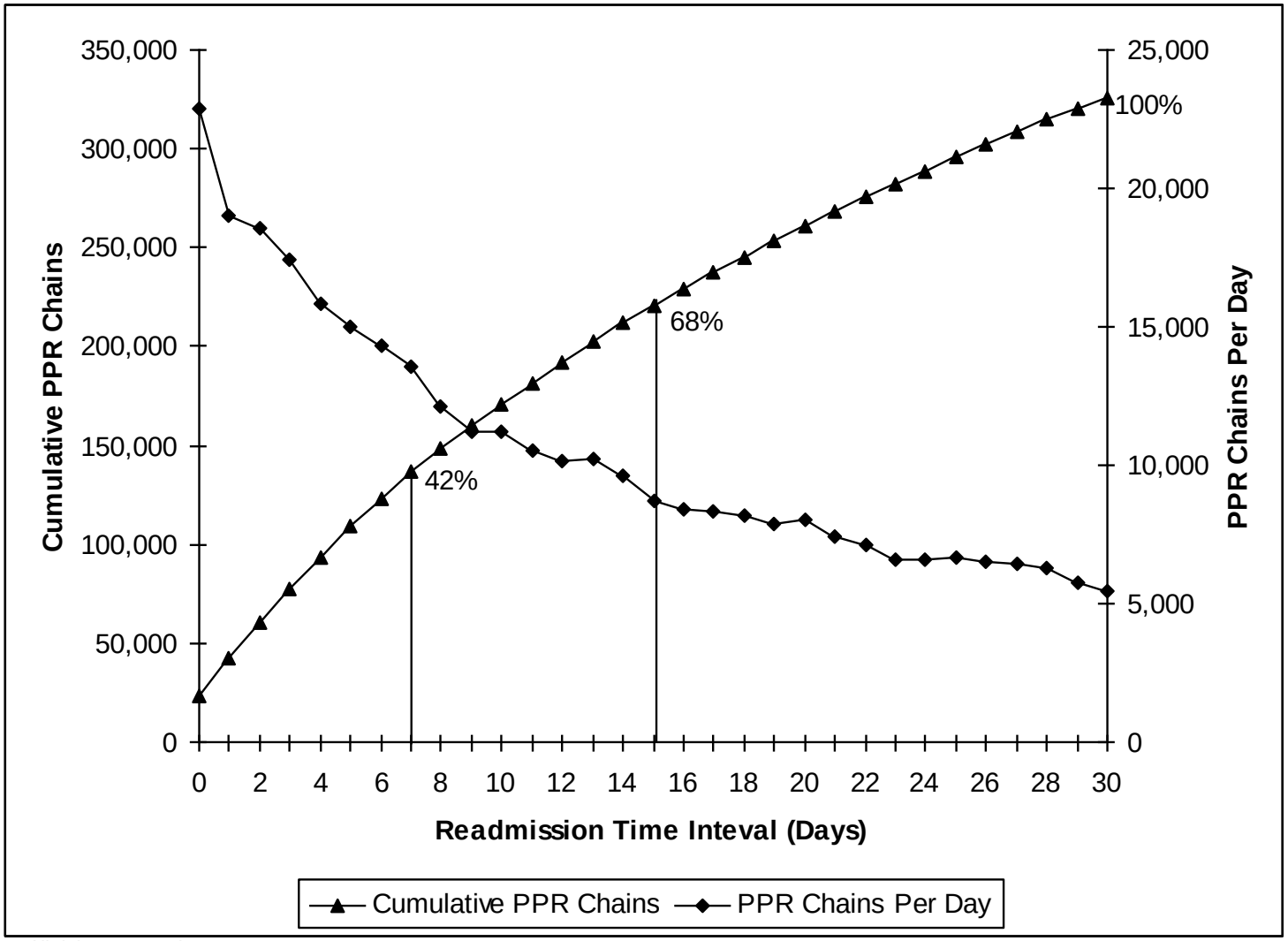
Readmission Issues

- Readmission time window
- Readmission to same hospital or any hospital
- Excluded sites of service
- Computation of expected value for individuals with mental illness

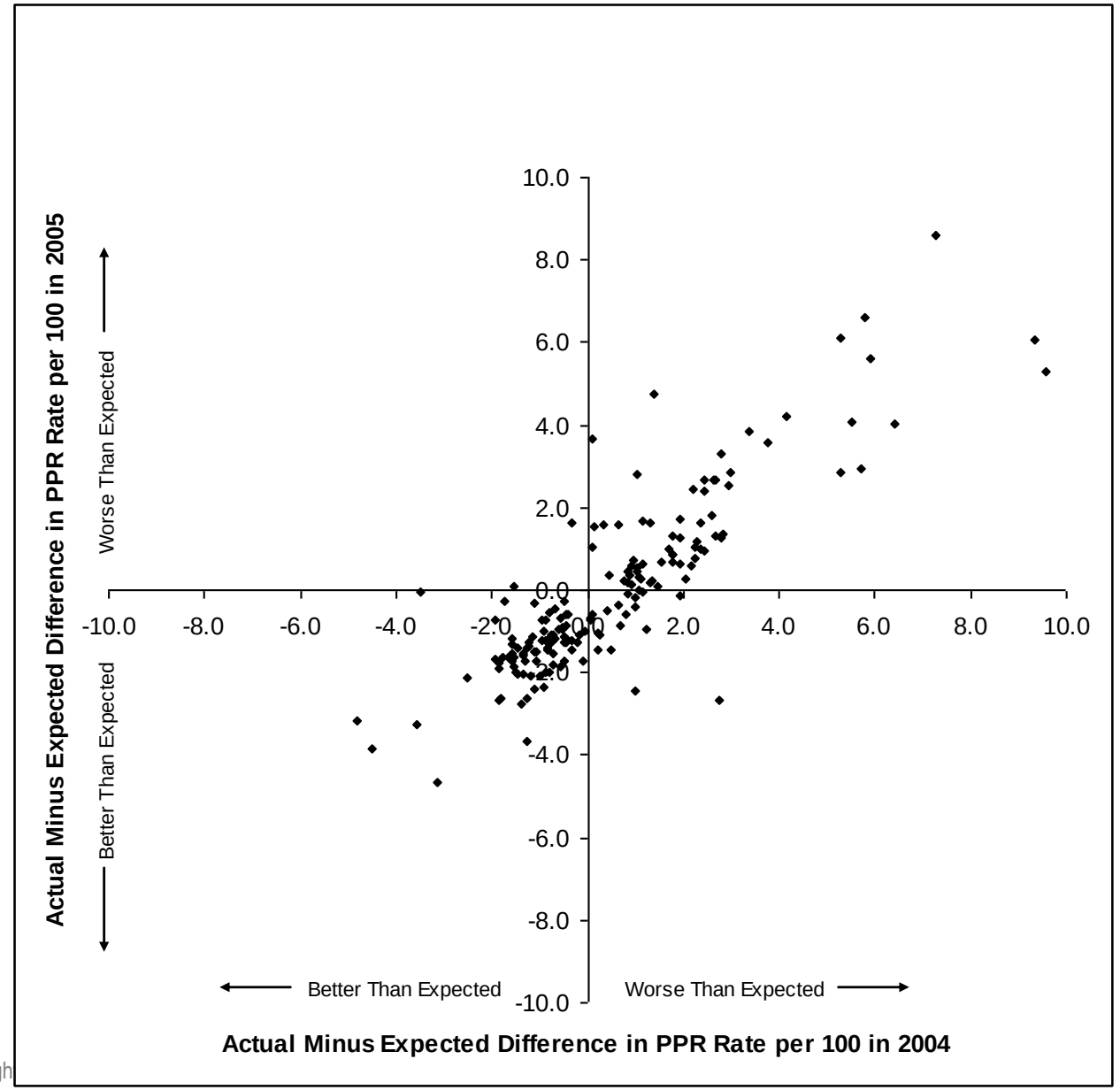
Actual v. Expected PPR Rates for Patients With and Without Major Mental Health or Substance Abuse Secondary Diagnoses

	No Major Mental Health or Substance Abuse Diagnoses				Major Mental Health or Substance Abuse Diagnoses			
Age Group	Number of Candidate Admissions	Actual PPR Rate	Expected PPR Rate	Actual/ Expected Ratio	Number of Candidate Admissions	Actual PPR Rate	Expected PPR Rate	Actual/ Expected Ratio
0-5 Years	72,643	3.77	5.17	0.729	362	8.29	10.04	0.826
6-18 Years	72,826	4.21	6.03	0.698	16,070	9.15	11.75	0.778
18-35 Years	211,084	5.12	5.85	0.874	68,268	11.76	11.4	1.032
36-55 Years	601,197	5.63	6.31	0.892	168,748	12.7	11.04	1.15
56-75 Years	929,102	6.98	7.64	0.914	82,706	12.86	10.69	1.204
76-85 Years	577,790	9.14	8.55	1.069	25,521	13.23	10.26	1.29
85 Years or Over	255,705	11.15	9.17	1.216	9,402	14.48	10.15	1.426
Total	2,720,347	7.23	7.43	0.972	371,077	12.48	10.98	1.137

Number of PPR Chains – by Readmission time Interval up to 30 days

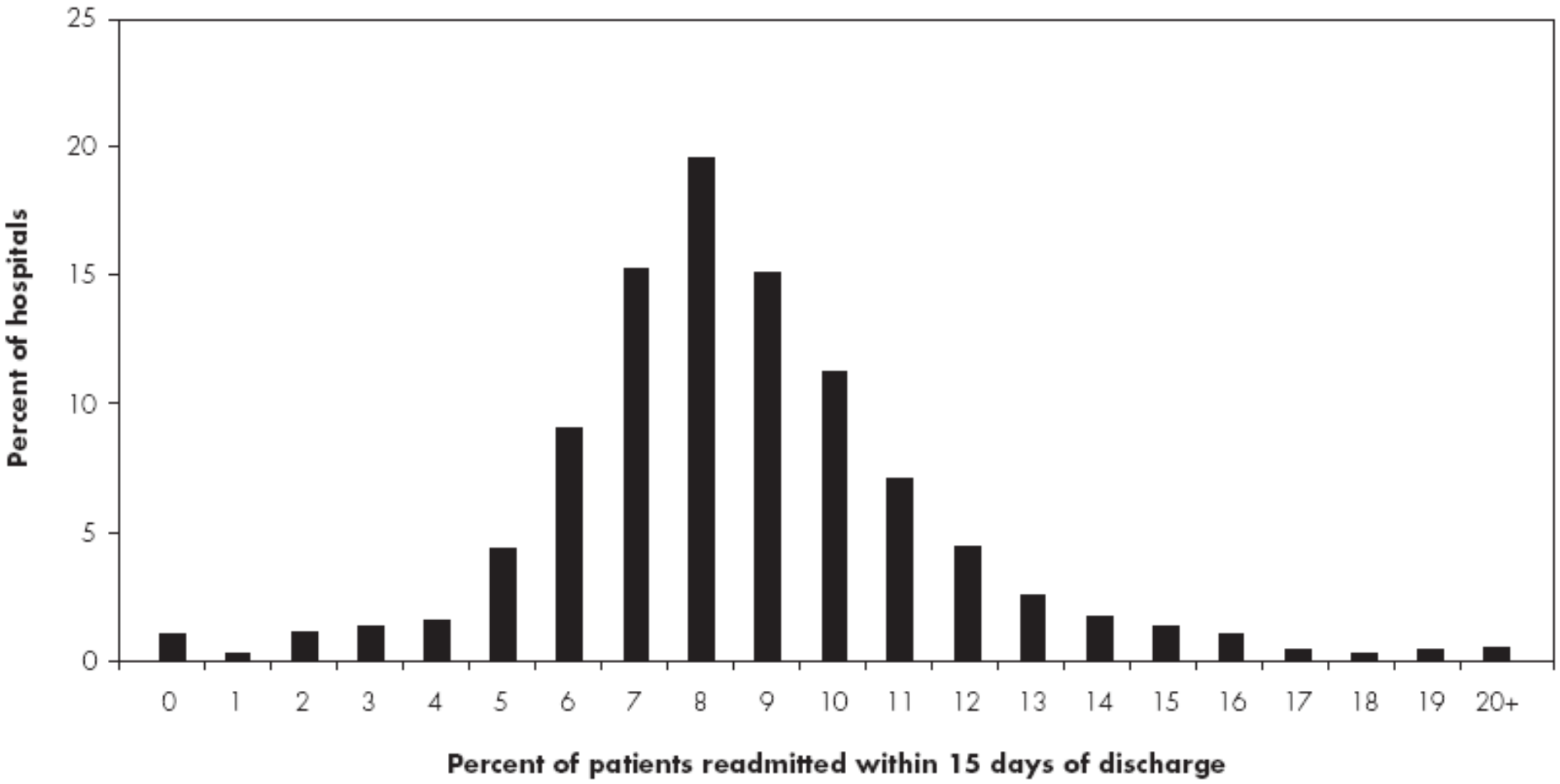


PPR Stabililty



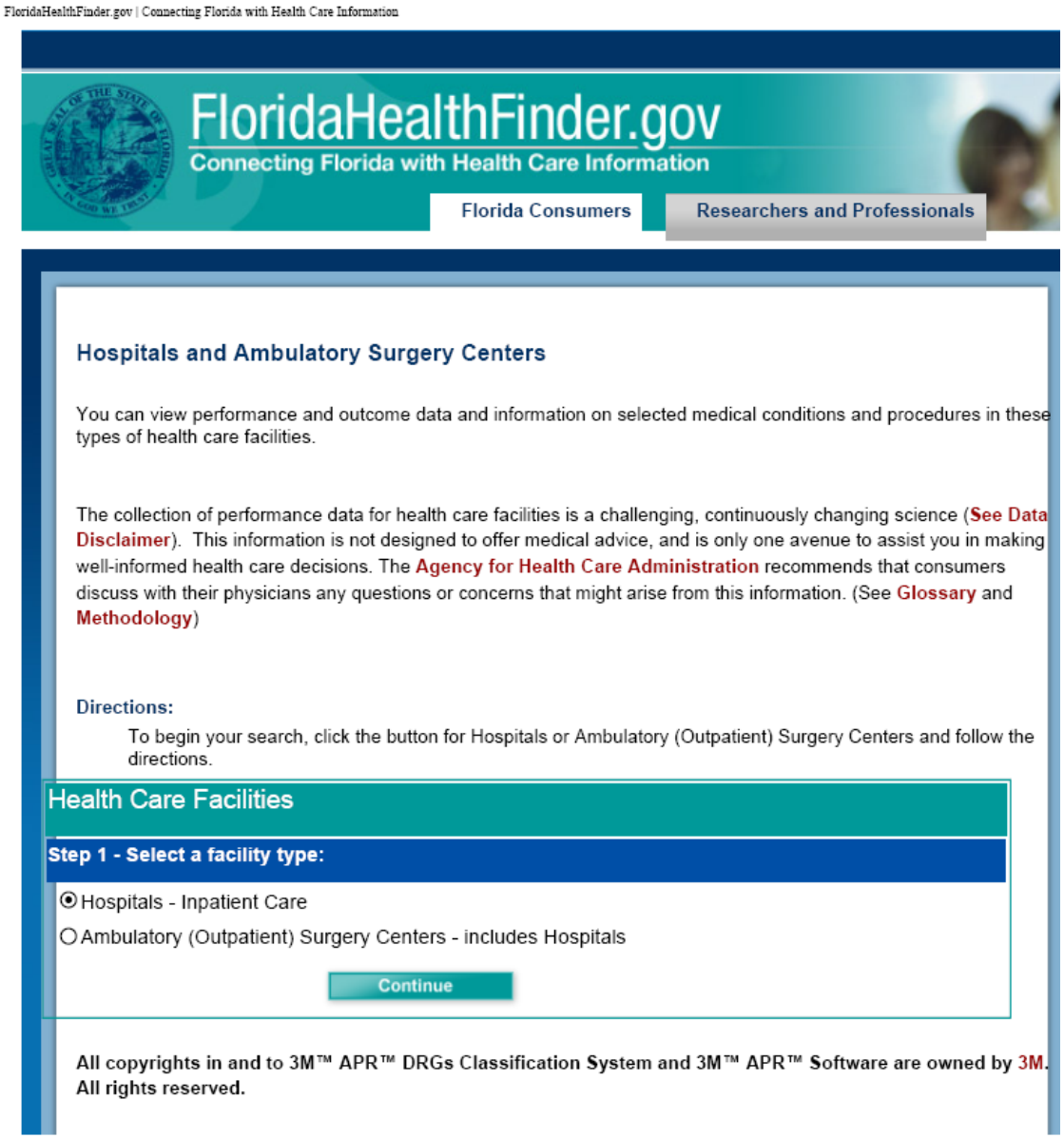
Variation in PPRs across hospitals

MedPAC 2007 (Not severity adjusted)



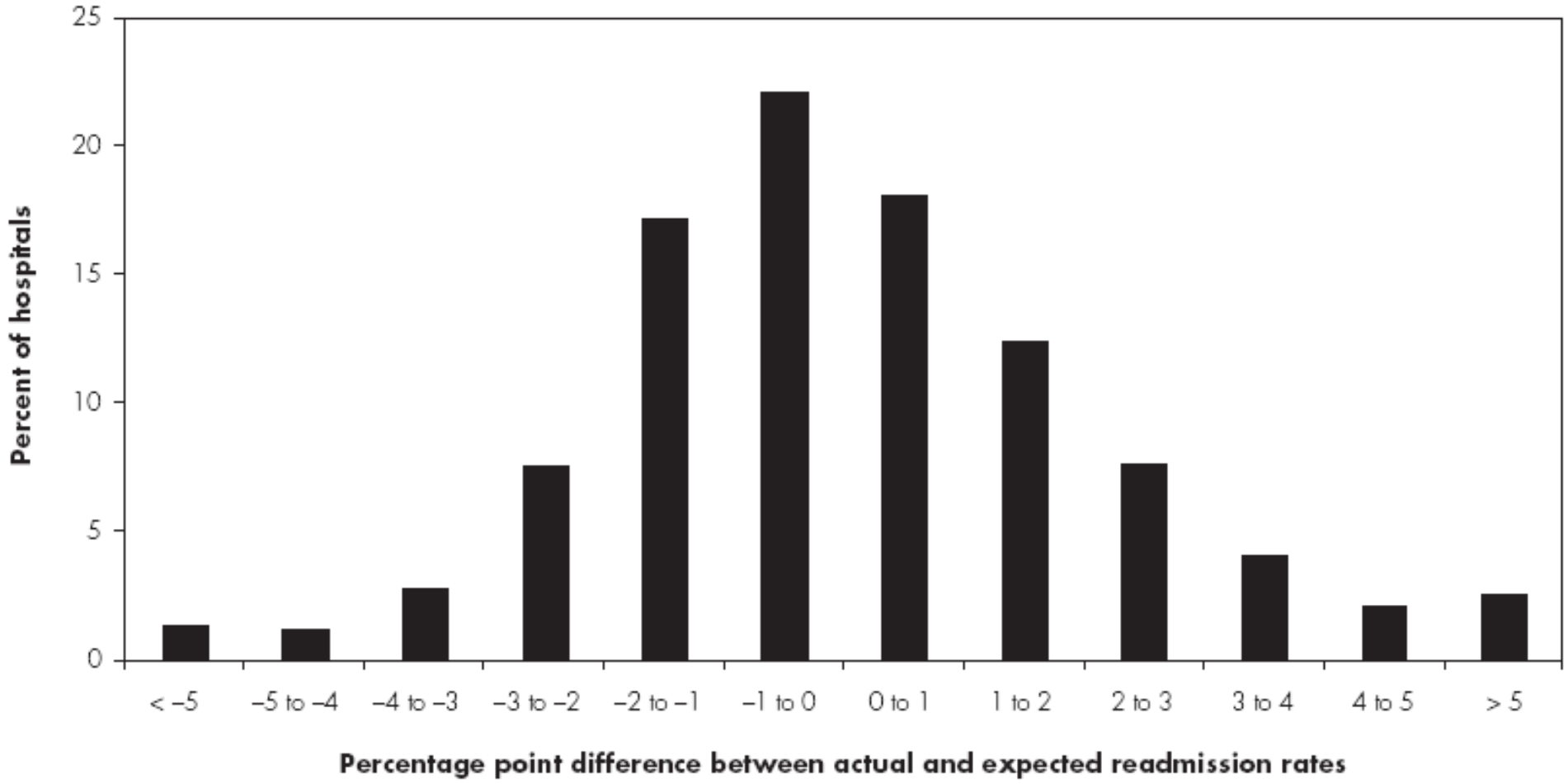
Florida PPRs

- June 2008
- Public Reporting of PPR rates for 210 Hospitals in Florida - Risk Adjusted by APR DRGs



Variation in PPRs across hospitals

MedPAC 2007 (Severity adjusted)



Variability in readmissions for CHF for Medicare beneficiaries 2005 (MedPAC 2007)